

**UNITED STATES PATENT APPLICATION**

of

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for

**TABLE HAVING H-CENTER SUPPORT ASSEMBLY**

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## UTILITY TABLE

### CROSS-REFERENCE TO RELATED APPLICATIONS

**[001]** This application claims priority to Chinese Patent Application No. 02269593.1, filed September 24, 2002, entitled “UTILITY TABLE WITH NO SIDE RAIL,” which application is hereby incorporated by reference in its entirety.

### BACKGROUND OF THE INVENTION

#### Field of the Invention

**[002]** The present invention relates generally to supporting structures and, in particular, to utility tables that may not include a side rail. Advantageously, the utility tables may be used in connection with many different types of articles such as residential furniture, office furniture, travel products, camping products and the like.

#### Description of Related Art

**[003]** Many different types of furniture are well known in the industry. For example, one type of furniture that is well known is a conventional utility table as shown in Figure 1. A conventional utility table includes a table top A' that is often constructed from plastic. As shown in the accompanying figure, two table legs C' may support table top A' and a strut frame B' may support the table legs C'. The table legs C' and strut frame B' are often constructed of a metal, such as steel.

**[004]** As shown in Figure 1, the strut frame B' may include two spaced apart side rails B'-1. The side rails B'-1 are often elongated U-shaped or C-shaped members with the open face disposed towards the table top A'. The table top A' may include a

positioning member upon which is mounted the side rails B'-1. The side rails B'-1 can then be connected to table top A' with screws or other attachment means. The strut frame B' may also include two end rails B'-2 and the ends of end rails B'-2 may be connected to the ends of side rails B'-1. The end rails B'-2 are also connected to table legs C so that the strut frame B' provides a way to connect the table legs C to the table top A'.

[005] In order to assemble the conventional folding utility table shown in Figure 1, the strut frame B' is attached to the table legs C'. The assembled strut frame B' and table legs C' are then placed onto a table top A'. The side rails B'-1 are then positioned and connected to the table top A'. Disadvantageously, the amount of work required to assemble this type of conventional table is relatively large. Further, the weight and complexity of the table is increased because of the multiple parts of the strut assembly B'.

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## BRIEF SUMMARY OF THE INVENTION

[006] A need therefore exists for a utility table that eliminates the above-described disadvantages and problems.

[007] One aspect of the invention is a utility table with fewer parts than conventional utility tables. Advantageously, the simplified structure reduces the complexity of assembling the table, which reduces manufacturing costs and the weight of the table.

[008] Another aspect is a utility table that does not require side rails but provides sufficient strength to support objects thereon without excessive bowing. Significantly, the utility table may actually have greater strength than conventional utility tables depending, for example, on the features and materials used to construct the utility table.

[009] Still another aspect is a utility table with a substantially planar table top. The utility table may include a pair of legs connected to the table top.

[010] Another aspect is a utility table with a lip extending outwardly from the bottom surface of the table top. Desirably, the lip is disposed about the perimeter of the table top, but the lip may be located in any desired portion of the table top. Advantageously, the lip may serve as a structural member for attaching the table legs to the table top and the lip may eliminate the need for side rails or additional side rails. Desirably, the lip has a first pair of connecting apertures located near the first end of the table top and a second pair of connecting apertures located near the second end of the table top. The bottom surface of the lip may include a plurality of grooves and a recess may be formed on the surface of the lip opposing the connecting aperture. Significantly, the plurality of grooves and the recess may assist to support and distribute the weight of the table.

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[011] Another aspect is to pivotably connect the table leg to the connecting apertures. For example, the cross pole can be directly disposed in a pair of connecting apertures. Alternatively, a bushing or sleeve may be disposed in the connecting apertures for receiving the ends of the cross pole. The sleeve may include at one end a fixing plate so that when the sleeve is disposed in a connecting aperture, the fixing plate abuts a surface of the lip. The fixing plate can be secured to the lip with one or more screws. The sleeve can cooperate with the plurality of grooves on the bottom surface of the lip. The sleeve can also engage the recess to distribute the weight and forces experienced by the connecting assembly.

[012] Yet another aspect is the connecting assembly may include a pair of sleeves. Advantageously, a substantially aligned connecting aperture may be formed on the opposing surface of the lip. A first sleeve may be disposed in the first aperture and a second sleeve may be disposed in the second aperture. Significantly, the first sleeve and the second sleeve may be slidably coupled or engaged.

[013] A further aspect is a utility table including a blow-molded table top with a first end, a second end, a top surface and a bottom surface extending between the first end and the second end. The blow-molded table top may have a lip extending outwardly from the bottom surface and the lip may have an interior surface, outer surface and a bottom surface. The table top may also include a first connecting aperture formed in the interior surface of the lip near the first end of the table top. The table may also have a first table leg with a first end and a second end, a first cross pole having opposing ends, the first cross pole being connected to the first end of the first table leg, wherein one of the ends of the first cross pole is at least partially disposed in the first connecting aperture.

[014] The utility table may further include a first sleeve having a first end and a second end, wherein the second end of the first sleeve is at least partially disposed in the first connecting aperture.

[015] The utility table may further include a first recess formed in the exterior surface of the lip, wherein the first recess is substantially aligned with the first connecting aperture.

[016] The utility table may further include the second end of the first sleeve being configured to engage the first recess.

[017] The utility table may further include the first sleeve having a substantially circular cross section.

[018] The utility table may further include the first sleeve having a substantially square cross section.

[019] The utility table may further include the first end of the first sleeve having a fixing plate.

[020] The utility table may further include the lip having at least one groove.

[021] The utility table may further include the at least one groove abutting against the first sleeve.

[022] The utility table may further include a second connecting aperture formed in the exterior surface of the lip and substantially aligned with the first connecting aperture.

[023] The utility table may further include a second sleeve having a first end and a second end, the second end being at least partially disposed in the second connecting aperture and substantially aligned with the first sleeve.

[024] The utility table may further include the first sleeve and the second sleeve being slidably engaged.

[025] The utility table may further include the first end of the second sleeve having a fixing plate.

[026] Another aspect is a method of manufacturing a utility table including the steps of forming a blow-molded table top. The table top preferably has a first end, a second end, a top surface, and an opposing bottom surface extending there between. A lip may extend outwardly from the bottom surface of the blow-molded table top and the lip may have an exterior surface, an interior surface, and a bottom surface. A first connecting aperture may be formed in the interior surface of the lip. A cross bar may be connected to an end of a table leg and inserting a first end of the cross bar at least partially within the first connecting aperture.

[027] The method may further include inserting a first end of a first sleeve at least partially within the first connecting aperture.

[028] The method may further include forming at least one groove in the bottom surface of the lip.

[029] The method may further include placing the first sleeve so that the first sleeve abuts the at least one groove.

[030] The method may further include forming a first recess on the exterior surface of the lip.

[031] The method may further include engaging the second end of the first sleeve with the first recess.

[032] The method may further include forming a second connecting aperture on the exterior surface of the lip.

[033] The method may further include inserting a first end of a second sleeve at least partially within the second connecting aperture.

[034] The method may further include coupling the first sleeve and second sleeve so that the first sleeve and the second sleeve are slidably engaged.

[035] The method may further include inserting the first end of the cross bar at least partially within the first sleeve and the second sleeve.

[036] These and other aspects, features and advantages of the present invention will become more fully apparent from the following detailed description of preferred embodiments and appended claims.

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## BRIEF DESCRIPTION OF THE DRAWINGS

[037] The appended drawings contain figures of preferred embodiments to further clarify the above and other aspects, advantages and features of the present invention. It will be appreciated that these drawings depict only preferred embodiments of the invention and are not intended to limit its scope. The invention will be described and explained with additional specificity and detail through the use of the accompanying drawings in which:

- [038] Figure 1 is a perspective view of a conventional folding table;
- [039] Figure 2 is a perspective view of a utility table in accordance with a preferred embodiment of the invention;
- [040] Figure 3 is an enlarged view of a portion of a utility table;
- [041] Figure 4 is a cross-sectional view of a portion of a preferred embodiment of a utility table;
- [042] Figure 5 is a cross-sectional view of a portion of another preferred embodiment of a utility table; and
- [043] Figure 6 is a cross-sectional view of a portion of yet another preferred embodiment of a utility table.

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## DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

**[044]** Referring to Figures 2 through 4, an exemplary of a utility table includes a table top 1 supported by two table legs 3. A retaining assembly is formed from a cross pole 2 located at the ends of table legs 3 to connect the table legs 3 to the table top, and a V-shaped strut 4 and a support bar 5 connecting the table legs 3 to the table top 1.

**[045]** The table top 1 is preferably a blow-molded structure constructed from plastic. Table top 1 is a substantially planar structure which can be formed as a unitary structure or can be a folding structure comprising two or more substantially planar surfaces. The table top 1 includes a first end, a second end, a top surface, and an opposing bottom surface extending between the first end and the second end.

**[046]** Table top 1 includes a lip 11 formed along the outer periphery and depending or extending outwardly from the bottom surface thereof. In one embodiment, lip 11 is formed integrally with table top 1 as part of the blow-molding process. In another embodiment, lip 11 is formed as a discrete part which is subsequently fixed or bonded to the table top 1. Lip 11 is shown as being a substantially unitary structure. Alternatively, lip 11 may not encircle the table, but may constitute one or more structures depending outwardly from the table top 1.

**[047]** As shown in Figures 2 and 4, near the first end table top 1, a first pair of connecting apertures 12 is formed on an interior surface of lip 11. Similarly, near the second end of table top 1, a second pair of connecting apertures 12 is formed on an interior surface of lip 11. At least one pair of connecting apertures is located at each end of table top 1. Advantageously, connecting apertures 12 form a blind hole for connecting table legs 3 to table top 1. Connecting apertures 12 can be formed during the blow-molding process or may be drilled after the table top 1 is formed.

[048] As shown more clearly in Figure 4, on the outside surface of lip 11, at a location opposing each connecting aperture 12 is formed a recess 13. Preferably, recess 13 is substantially aligned with the opposing connecting aperture 12.

[049] Referring to Figure 2, a plurality of parallel grooves 14 are formed along the length of the bottom of lip 11. The parallel grooves 14 form a reinforcing band to strengthen lip 11. As shown in Figure 4, the cross-section of lip 11 has a wave-shaped configuration. In one embodiment, the depth of the grooves 14 is substantially parallel to the circumference of the connecting apertures 12.

[050] Connecting apertures 12 are configured to receive an end of cross pole 2. With reference to Figures 3 and 4, a bushing or sleeve 6 is configured to be disposed in connecting aperture 12. The outer diameter of the sleeve 6 along most of its length matches the diameter of connecting aperture 12. The inner diameter of the sleeve 6 is the same as the outer diameter of cross pole 2. At one end of the sleeve 6 is a fixing plate 61. The fixing plate 61 includes one or more screw holes being formed thereon. When sleeve 6 is inserted into a connecting aperture 12, fixing plate 61 abuts the interior surface of lip 11. Sleeve 6 can be secured to lip 11 by screws 7 which are drilled into the screw holes on fixing plate 61.

[051] As shown in Figure 4, sleeve 6 engages recess 13. That is, sleeve 6 is substantially aligned with recess 13. The inner diameter of sleeve 6 is slightly larger than the diameter of recess 13 so that the end of sleeve 6 can rest over recess 13.

[052] Sleeve 6, as shown in the accompanying figures, may have any suitable cross section that will fit in connecting apertures 12. For example, sleeve 6 may have a circular, square, rectangular, oblong cross-section. In one embodiment, recess 13 has the same cross-section as sleeve 6 so that the sleeve 6 and recess 13 can inter-engage.

[053] As discussed above, the depth of grooves 14 are substantially parallel to connecting aperture 12. The grooves 14 serve to reinforce the connecting assembly when disposed in connecting aperture 12. When sleeve 6 is disposed in connecting aperture 12, the bottom surface of the groove 14 abuts sleeve 6. The contact between groove 14 and sleeve 6 gives rise to a reinforcing support action, and supports the weight of the table. That is, when the table is placed upright, the sleeve 6 rests on the bottom surface of the grooves 14, which allows weight and other forces to be distributed along each of the grooves 14. In addition, the end of sleeve 6 engages with recess 13 to prevent the end of the sleeve 6 from bowing. The reinforcing grooves 14 or recess 13 or a combination thereof, serves to maintain sufficient evenness on the surface of the table top 1, and provides sufficient strength to obviate side rail structures known in conventional utility tables.

[054] During assembly, a sleeve 6 is disposed in each connecting aperture 12. A cross-pole 2 is connected to each table leg 3. The ends of the cross-pole 2 can then be inserted into sleeves 6 to secure the table leg 3 to table top 1. Sleeves 6 serve to guide the cross pole 2 into the connecting aperture 12. The sleeves 6 support the ends of the cross pole 2 to distribute weight along the length thereof so that all of the force is not at the connecting aperture. In addition, the sleeve 6 allows the cross poles 2 to rotate therein, which facilitates rotation of the table legs 3.

[055] As shown in Figure 2, table top 1 also has two U-shaped inner lips which face each other. The interior surface of the inner lips has connecting apertures similar to those described above. In addition, bushings or sleeves similar to those described above may be used to align an end of a center bar 22 therein. The center bar 22 is shown connected to an end of support bar 5. The other end of support bar 5 is

connected to a V-shaped strut 4. The other end of V-shaped strut 4 is connected to a table leg 3.

[056] Figure 5 illustrates another embodiment for connecting table top 1 to cross pole 2. Figure 5 illustrates that cross pole 2 can be directly disposed in a connecting aperture 12 without the use of other connecting pieces. Although not shown, grooves 14 or recess 13 may be formed on lip 11. Grooves 14 may be configured to abut cross pole 2. Recess 13 may be configured to engage an end of cross pole 2.

[057] Another embodiment of the table top 1 and a connecting assembly is illustrated in Figure 6. In this embodiment, table top 1 is formed of blow-molded plastic. A first connecting aperture 12 is formed on the interior surface of the lip 11, and an opposing second connecting aperture 12' is formed on the exterior surface of the lip. The first connecting aperture 12 and the second connecting aperture 12' are substantially aligned. In addition, a recess 15 may be formed in connection with the second connecting aperture 12'. In this embodiment, lip 11 does not have reinforcing grooves 14 formed on a bottom surface thereof.

[058] A first sleeve 6 is disposed in the first connecting aperture 12 and an opposing second sleeve 6' is disposed in the second connecting aperture 12. Preferably, first sleeve 6 and second sleeve 6' are substantially aligned. They do not have to touch each other. Recess 15 provides a notch which serves to guide the second sleeve 6' into the second connecting aperture 12. In addition, recess 15 protects the end of the second sleeve 6' from being exposed.

[059] In another embodiment, shown in Figure 6, first sleeve 6 and second sleeve 6' slidably engage so as to form a telescoping connecting assembly. That is, the inner diameter of the first sleeve 6 is larger than the outer diameter of the second sleeve 6' so

that they can slidably engage. The first sleeve 6 and second sleeve 6' include fixing plates located at opposing ends. Thus, when the first sleeve 6 is disposed in connecting aperture 12, the fixing plate of the first sleeve 6 abuts against the interior surface of lip 11. Similarly, when the second sleeve 6' is disposed in connecting aperture 12, the fixing plate of the second sleeve 6' abuts against the exterior surface of lip 11. In one embodiment, the inner diameter of the second sleeve 6' is larger than the outer diameter of cross pole 2 so that cross pole 2 may be disposed therein.

**[060]** When assembling the utility table, the first sleeve 6 and second sleeve 6' are disposed in connecting apertures 12 and 12'. First sleeve 6 and second sleeve 6' may or may not engage. The cross poles 2 are then disposed in the connecting assembly to secure the table leg 3 to table top 1.

**[061]** The present invention may be embodied in other specific forms without departing from its spirit or essential characteristics. The described embodiments are to be considered in all respects only as illustrative and not restrictive. The scope of the invention is, therefore, indicated by the appended claims rather than by the foregoing description. All changes which come within the meaning and range of equivalency of the claims are to be embraced within their scope.

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